In the last group a bony plate was detached in the same region, so as to expose the dura mater, which was not injured. Some hemorrhage followed the operation, but no amaurosis. In none of the dogs experimented upon were cicatricial adhesions observed between the skin and periosteum, nor did suppuration occur in any. Wherever the skin was divided, metallic sutures were employed to hold the lips of the wound in apposition.

The following conclusions may be deduced from the foregoing:—

1. Amaurosis following wounds of the eyebrow is generally the result of cerebral lesions, as proved by the fact that in the greater number of cases the patient loses consciousness or dies soon after the accident.

2. Although modern ophthalmological literature does not contain a single instance, followed up from beginning to end by ophthalmoscopical examinations, two of my cases, and Galezowski's observations go to show that amaurosis is due to atrophy of the papilla, and this to a cerebral lesion of more or less severity, or to injury of the optic nerve in its passage through the optic foramen.

3. Those cases where the amaurosis is attributed to sympathetic action or excitability of the fifth pair of nerves, from whatever cause, occurred previous to the employment of the ophthalmoscope, and were open to erroneous interpretations.

4. The amaurosis occasioned by simple irritation of the supra-orbital nerve, from punctures, cicatricial distension, or any other cause, might at the present time be doubted in the absence of a single complete clinical record to support it; but, inasmuch as sympathetic amaurosis from excitability of the maxillary branch of the fifth has been observed, the possibility of a similar result as regards the supra-orbital, one of the three principal branches of the trigeminus cannot consistently be denied.

5. The entire identity between amaurosis from irritation of the superior maxillary and supra-orbital nerves once conceded, the prognosis must be considered equally favourable in either case; for amaurosis from wounds of the eyebrow resulting in atrophy of the papilla is incurable.

6. The experiments on dogs inflicting divers traumatic lesions on the supra-orbital region have not been followed by amaurosis.

HAVANA, Cuba, October, 1880.

ARTICLE V.

THE CAUSES AND TREATMENT OF METRORRHAGIA AND MENORRHAGIA.

By RUDOLF TAUSZKY, M.D., Attending Physician and Surgeon to the Mount Sinai Hospital, Out-door Department (Gynæcological Diseases of Women).[1]

THE subject of this paper embraces the treatment, and the direct as well as some of the remote causes of metrorrhagia and menorrhagia as they

[1] Read before the Obstetric Section of the New York Academy of Medicine, June 24, 1880.

occur in the practice of the gynæcologist. The following observations are based upon the study of 98 cases of alarming uterine hemorrhage (in menstruating women) which I have attended within the past two years, and propose to consider under the following propositions:—

1. What are the known pathological conditions of the uterus and its appendages, giving rise to excessive uterine hemorrhages and hyperæmic conditions of the same?

2. Are we always able, with the means at our command, in the present state of our science, to check uterine hemorrhages?

3. Is the practice of treating women suffering from uterine chronic hyperæmia, menorrhagia or metrorrhagia during the inter-menstrual period only, a correct one, and the best method to be pursued, or is it not more rational to treat them shortly before, during, and immediately after menstruation as well as during the inter-menstrual period?

4. What is our practical experience regarding the value of Emmet's trachelorraphy as a curative agent for chronic menorrhagia and metrorrhagia?

5. What is the value of the curette, first introduced by Recamier in 1850, for the removal of fungosities of the uterine mucosa, and consequent excessive uterine hemorrhage; and is the dull wire curette of Dr. T. Gaillard Thomas not a far safer instrument to be used for menorrhagia and metrorrhagia?

6. What is our experience and that of others regarding the value of hot-water injections as a uterine depleting measure and hemostatic?

7. Is the intra-uterine use of the solutions of iron (like Monsell's, half diluted) a safe and justifiable procedure or not in the treatment of some of the affections under consideration, if applied with the necessary precautions, and according to established and now well-understood scientific principles?

8. What are the symptoms of chronic menorrhagic menstrual endometritis (as described by A. Schott, in Volkmann's "Clinical Lectures," No. 161) which I found to be present in thirty of the cases which I have attended for metrorrhagia that had lasted from one to three years?

In answer to the first question, I will enumerate the causes of metrorrhagia and chronic uterine hyperæmia as we find them mentioned in the text-books, with several additions which I have ascertained, but of which no mention is made in publications with which I am familiar. These are the following: Pelvic peri-uterine or retro-uterine hematocele, extra-uterine pregnancy, oöphoritis, salpingitis, peritonitis, cystitis, perimetritis, and parametritis, metritis or endometritis; versions or flexions of the womb, especially latero-flexions; atony and subinvolution of the uterus; new formations within or around the uterus; large abdominal tumors, compressing the uterus itself or the ascending vena cava, or its branches; extensive laceration of the uterus or its cervix; granulations, erosions, ulcerations,

or fungosities; cystic degeneration of the cervix; mucous and fibrous polypi; inversion of the uterus; retained portions of the placenta or the ovum; chronic pelvic or uterine congestion caused by thinness and narrowness of the bloodvessels; chlorosis menorrhagica (Virchow); general circulatory disturbances; chronic diseases of the lungs, the heart, the liver, the kidneys; faulty development of the genital organs, or of their blood-vessels; hemophilia; chronic disturbances of the whole or a part of the digestive and nervous apparatus; habitual abortions from syphilis, fatty placenta, etc.; traumatic causes; extensive uterine adhesions; gonorrhœa in the husband; uterine infection caused by the introduction of unclean instruments, by the fingers of physicians or nurses, or self-infection; acute exanthemata, typhus fever, cholera, lead or phosphorus poisons; movable kidney, syphilis, purpura hemorrhagica, scurvy; unsatisfied sexual desire in women who are considerably younger than their husbands; exhausting mental or physical overwork; insufficient food supply; too tight lacing; neglected, habitual constipation; grief; disappointments; want of proper rest; exposure to a chilly or impure atmosphere; imprudent behaviour during menstruation; too frequent unobserved proximity and illegitimate familiarity of the young female with the male; too frequent visits, of especially unmarried women, to balls, parties, theatres, and other public places of amusement; the reading of obscene literature; too early rising out of bed after abortion or child-birth at full term; too frequent coitus; masturbation.

In some of my cases, upon the closest bimanual and intra-uterine examination, there could be found nothing pathological to account for the hemorrhage, and still the patients—some of them married and mothers of one or more children, others married, but sterile, a few unmarried and innocent—who consulted me for uterine hemorrhage, stated that they bled from two to three times, some oftener, within a month, losing considerable quantities of blood each time; the flow lasting longer than at their normal periods, and they suffered also from quite profuse leucorrhœa, often tinged with blood.

The sufferers were, of course, usually anæmic, they complained of frequent headaches, loss of appetite, general weakness, irritable bladder, and not unfrequently of nausea, and pain in the epigastric and hypogastric or the iliac regions. They felt very nervous, peevish, and irritable. At times their courses would stop for a couple of months, when an abortion would follow in some cases, and the frequent and irregular bleeding would recur again as before. The bowels were usually sluggish and constipated; sleep was often disturbed and unrefreshing. Careful bimanual and intra-uterine examination taught me in some of these patients that the profuse flow of blood from the uterus was due to an excessive hyperæmic condition of the pelvic organs, especially of the endometrium, which was found to be soft, flabby, swollen, much thickened; the uterine probe or sound glided

over it, especially at the os internum, as if meeting with a resistance, and when passed into the cavity of the body it became quite painful, especially when touching the fundus uteri. Upon withdrawal some drops of blood were observed upon it, a slight flow from the endometrium following it.

In the text-books on gynæcology these cases are described as suffering from pelvic congestion and endometritis, and the treatment usually recommended is rest in the recumbent posture, with the foot of the bed elevated, laxatives, the local abstraction of blood, the hot vaginal douche, narcotics for the relief of pain, and intra-uterine medication with tincture of iodine, Churchill's solution, or carbolic acid ℥ss to ℥j of glycerine, or nitrate of silver 10 to 20 grs. to the ounce of distilled water; in obstinate cases nitric acid is recommended to be applied to the endometrium once or twice a week during the inter-menstrual period; and the rule is generally followed in these cases to abstain from all medication during the time of menstruation, with the exception, perhaps, of relieving pain by narcotics, and of giving to the patient 10 to 15 drops of the elixir acidi Halleri, largely diluted in water, if the menorrhagia is very profuse. I will, *en passant*, mention here that in the cases of endometritis menorrhagica chronica, in accordance with Dr. Schott's advice (*loc. cit.*), I have followed the practice successfully of treating such women shortly before, during, and immediately after menstruation in the manner which I will describe further on.

The second proposition I answer in the affirmative. We are almost always able, as far as my experience goes, to arrest any uterine hemorrhage we are called upon to treat in our gynæcological practice by the use of the intra-uterine tampon, and the application of the solutions of iron to the bleeding endometrium after emptying the uterus of clots, polypi, retained portions of placenta or of the ovum, the removal of papillary growths, granulations, or fungosities by means of Thomas's dull wire curette, or by the introduction of the hot iron in desperate cases—Paquelin's thermo-cautery, for instance. Only in one case, seen by me after miscarriage (5th month), having been tired out by overwork that day, did I fail to remove some portion of placenta, but my colleague, Dr. Mundé, whom I called to my assistance, removed it, however, for me, with the result of checking the hemorrhage. The woman fully recovered.

As it is not my purpose to consider the treatment of placenta prævia, post-partum hemorrhage, or that occurring from threatened abortion, or uterine bleedings coming within the domain of the obstetrician, I should not have mentioned this case had it not occurred immediately after an abortion at four and a half months, in a woman who had bled to a frightful extent for several weeks before I saw her, and yet even in this desperate case the hemorrhage was checked by the application of Monsell's solution, after the uterus had been thoroughly emptied. I have never seen any evil results follow its application in at least fifty cases of profuse uterine hemorrhage in which I have applied the solutions of iron intra-uterum. I never use

it, of course, unless the uterine cavity be fully dilated, which I consider a safe rule in making any intra-uterine application. After dilating with laminaria or tupelo, never with a sponge tent, and medicating the cavity with an ointment of alum, 3–4 grs. to each application, or with bougies made of tannic acid and gum tragacanth, I never hesitate for one moment, if these measures fail, to apply the solutions of iron, concerning the use of which I have seen recently in the "Transactions of the American Gynæcological Society" fears expressed that I do not think need ever be entertained if the remedy be used by skilful hands.

During excessive menstruation, or shortly before it, I place my patients in bed with their hips elevated, not the foot of the bed—as recommended in our text-books. I also rely greatly in robust individuals on salicylate of soda administered internally, or per rectum, if there is an elevation of temperature, or I abstract blood locally by scarifying the endometrium; I administer digitalis in large doses if the heart's action is found to be irregular, instead of the salicylate—hot vaginal douches I continue until the bleeding stops, and advise the patients to use ergotine either internally, or I give it hypodermically—even during, shortly before, or immediately after the menses have ceased. In severe pelvic congestions I continue this treatment even during the inter-menstrual period, although giving the medicines in lessened doses. Where I want a more decided contraction of the uterine and peri-uterine bloodvessels, I also use, once a week, cauterizations of the endometrium, with either Churchill's solution of iodine or the carbolic acid solutions used in the New York Woman's Hospital for endometritis chronica, but only one week before and after the usual time of menstruation. Tonics are, of course, not omitted in those cases needing them, and gentle laxatives and enforcement of hygienic rules are the *sine qua non*.

Among other tonic agents I have found none superior to the cold sponge bath, which is an excellent nerve tonic and stimulant. The temperature of the body can be lowered by this means from 1 to 2 degrees Fahr. Preferably to the cold sponging I employ occasionally the rubbing of the patient with the coarse, wet, cold towel, or the wet sheet, dipped in water of a temperature ranging from 62° to 52° F., well wrung out and wrapped around the patient tightly; before I apply the latter, I cool the head by cold applications so as to prevent a sudden congestion of the brain, which would otherwise follow. The friction bath is a powerful nerve stimulant, since the terminations of the peripheric nerves are thus stimulated the very moment of their contact with the sheet. This method causes a dilatation of the peripheric bloodvessels, thereby relieving congestion and hyperæmia of internal organs, and such complaints as cephalalgia, gastralgia, enteralgia are thereby often relieved. We can continue the use of the sheet one or more hours if necessary, until the temperature is considerably reduced (to the normal standard); to prevent the sheet

from becoming dry we pour more water upon it from time to time. Colder portions of the body are to be rubbed until they get warm, the hands and feet for instance. Painful parts are covered with wet cloths, in addition to the sheet, of course a rubber sheet is always necessary, so as to prevent the chair, sofa, or bed occupied by the patient during the bath from getting wet.

There is one rule which I desire especially to mention, as of the utmost importance in administering cold baths, or even cold applications to any part of the body, viz., the skin must become red, never bluish or pale. The patient should never feel chilly while in the wet sheet. If this happens, I have her well rubbed all over until she gets warm, or I remove the sheet and give some hot drink, tea, coffee, or warm milk and brandy, and let her go to bed at once, so as to get thoroughly warmed through. By these and similar means, I usually succeed in relieving menorrhagiæ and metrorrhagiæ that have resisted treatment often for several years.

I desire now to direct attention to the consideration of the physical symptoms of chronic menorrhagic endometritis as a cause of metrorrhagia. In the cases thus affected, the mucous membrane—the endometrium—attains a thickness of five millimetres and more, normally it measures but two or three mm. Here we have a condition precisely similar to that which occurs at every normal menstruation. This important function has been recently carefully studied by Kundrat of Gratz, and Engelmann of St. Louis, Williams of London, and Gerhard Leopold of Leipzig. (See the *American Journal of Obstetrics*, May, 1875, and April, 1878, "The Mucous Membrane of the Uterus during Menstruation.") In order to substantiate that this "endometritis menstrualis" is simply an exaggerated normal menstruation, as stated by A. Schott, and fully verified by myself after a careful study of the subject, I will quote what the observers mentioned have found to take place on the uterine mucosa during normal menstruation, and I think that it will be at once seen that the two processes are almost entirely identical. The changes taking place are the following, according to Leopold:—

"The mucous membrane hypertrophies as the time of the menstrual flow approaches, from a thickness of 2–3 mm. in the inter-menstrual periods, it attains that of 6 or 7 mm. at the appearance of the flow, gradually decreasing during its continuance, until at the end of the period the mucosa is found void of its superficial layer—but within a day or two again appearing in its normal inter-menstrual condition with the thickness of 2–3 mm., the glands of the menstrual membrane are no longer narrow and straight as in the membrane at rest. They have become enlarged and tortuous in their course, with marked sinuosities, especially the central layers; the inter-glandular tissue consists of short fusiform, so-called, cells, with large nuclei, which are found in a condition of active reproduction in the lower layers in contact with the muscular tissue. Characteristic are the young cells which pervade the entire tissue as well as the blood-corpuscles which are found in the uppermost layers, closely surrounding the engorged vessels, and rarely extending into the membrane as far as the middle layers. In marked contrast to the frequency of the enlarged capillaries and arteries in the uppermost layers of the mucosa is the scarcity of veins, which appear but here and there,

running in a direct course toward the muscularis. Leopold further asserts that for several days an extravasation of red and colourless blood-corpuscles takes place from the enlarged and superficial capillaries into the surrounding tissues, especially toward the surface of the mucosa; the uppermost layer of cells is undermined and separated from the underlying layers. A copious layer of blood reaches the superficial capillaries through the numerous arteries, although it arrives but slowly on account of the tortuosity of the vessels—its progress is checked by the enormous dilatation of the capillaries, and the scarcity of the returning veins; hence the rupture of the distended capillaries and the escape of blood through the uterine cavity into the vagina. Regeneration takes place by the absorption of the remaining extravasated blood-corpuscles, reproduction of inter-glandular tissue, and covering of the new-formed surface by an upward growth of cylindrical epithelium, lining the glands. From the eighteenth day on, the mucosa again begins to hypertrophy, the vessels diminish in size, but the glands lengthen and become more sinuous, the entire tissue more soft and lax. Thus this membrane is in a condition of a constant change."

Leopold contradicts the statement of Kundrat and Engelmann that the superficial layers of the mucosa undergo a fatty change and are being thus shed or desquamated at each menstrual period. My own microscopic examinations convinced me that the statements of Kundrat and Engelmann are fully correct, and that we find in every menstrual fluid epithelia which have undergone fatty changes. I have referred to this subject already in my publication "On the Anomalies of Menstruation," *N. Y. Physician and Pharmacist*, Oct. 1879. The uterine blood-pressure constantly changes during the menstrual years from puberty to the climacteric, especially in child-bearing women. If this uterine pressure is materially increased some of the over-loaded and distended superficial bloodvessels, the capillaries, have to give away and excessive menstruation gives rise naturally to anæmia, to nervous symptoms, and, if lasting for some time, makes the sufferers morose and peevish, dissatisfied with themselves and the world. The courses, says Schott, return twice or oftener a month, and continue for eight or ten days. We examine such women, and we find, perhaps, a cause for the bleedings, for instance a polypus, enlarged Nabothian follicles, bleeding granulations or ulcerations, but in the majority of cases we find nothing; the cervix is in a healthy condition. We use a laminaria or tupelo tent, we examine for fibrous polypi which we thought we could feel bimanually, but the most careful examination of the uterine cavity gives at first a negative result, except that we find an unusual softness and an easier mobility of the uterine mucosa. We also encounter small protuberances which prove to be folds, not outgrowths, of the endometrium, which disappear. And we find, by bimanual palpation, a considerable enlargement of such uteri.

These are cases in which we have a pathological excess of the menstrual swelling and a hyperæmia of the uterine mucosa. If we examine such women immediately after menstruation, the cavity of the womb still appears spacious, and it is somewhat longer and the body a little enlarged and swollen. At the next period we find the uterus still larger, the disproportion between the body and the neck becomes more and more apparent, and

the uterus feels like a pedunculated tumour; the heavy, large uterus resting upon a relatively thin and long cervix, tips over, and we have the picture of a decided flexion before us—ordinarily an anteflexion.

The swelling of the mucosa, as is known, occurs during normal menstruation, principally within the cavity of the uterus and the Fallopian tubes; we find it therefore swollen at the internal os, considerably and abruptly elevated. The sound encounters in the cavity of the body the thickened mucous membrane, and cannot be passed as easily as in the cervix. The normal texture of the endometrium is not changed in these cases, only the damaging influences, some of which I have mentioned, cause circulatory troubles and an increased hyperæmia in the uterine blood-vessels and finally frequent ruptures with metrorrhagia and menorrhagia resulting. I have, therefore, dwelt upon it at some length, and I must here state that if we understand the causation of these affections the battle is half won when we are called upon to treat them. These chronic congestions may give rise by and by to inflammatory processes of the sexual organs, to the growth of polypi, or of sarcomata, fibromata, myomata, cysts, and even, perhaps, if persisting for years, to carcinomata or rodent ulcerations from mal- and over-nutrition, excessive blood-pressure, and emigration of colourless blood-corpuscles, the formation of juvenile medullary or embryonal tissue.

My researches and histological studies on the epithelial changes occurring during the growth of sarcomatous tumours, published by the Vienna Academy of Sciences, in vol. lxxiii., 3d division, January, 1876, have shown that connective tissue growths may originate in glandular structures, and that epithelia may by division and proliferation give rise to the formation of connective tissue new formations, like sarcomata. Each granule within the epithelium and each connecting link between the granules of the living matter of the protoplasma, within the epithelia—C. Heitzmann's threads and Max Schulze's thorns—may by their increase and growth develop under favourable circumstances into connective tissue formations. If the living matter assumes the fibrous structure we have the fibroma, if the arrangement is that of muscle we have a myoma, if the corpuscles remain in the embryonal condition, multiply and proliferate rapidly, and assume the malignant character we have the sarcoma, formerly termed encephaloid; and if it assume the alveolar structure with gland ducts we have the adenoma, and if within the alveoli no ducts are present we have the carcinoma. In the latter case the granules—the threads, and the thorns—are often transformed into epithelia forming alveoli without ducts. Recently Cohnheim stated that the fibroids of the uterus originate from a surplus of germ vesicles (Keimbläschen), pre-existing in excess to the number necessary for the construction of the normal tissue, but this excellent observer simply gives an opinion, an hypothesis, unsupported by facts, while my own investigations closely show the connection between

the causes and the effects of chronic hyperæmic conditions and new formations of tissue eventuating in new growths.

Professor Otto Frankenberg, of Starling Medical College, Columbus, Ohio, has translated my article published in Vienna, into English, in the *Ohio Medical and Surgical Journal*, 1877. I have adduced these studies of mine regarding the formation of neoplasmata with special reference to the female reproductive organs in order to prove the close connection existing between chronic hyperæmic conditions and their development and consequent metrorrhagiæ. The bleeding coming either from the tumour itself if it ulcerates and some portion of the same containing bloodvessels becomes eroded, or if it, by its bulk, prevents the uterus from fully contracting, and thus leaves openings in ruptured bloodvessels. For this reason we find the subperitoneal fibromata or myomata give rise to uterine hemorrhages less frequently than those of the interstitial or of the submucous variety.

What is our experience regarding the value of trachelorrhaphy as a curative agent for menorrhagia and metrorrhagia? In answer to this question I may state that I have seen uterine versions, cystic degeneration of the cervix, endometritis, subinvolution of the uterus with frequent metrorrhagia relieved, after having faithfully used the preparatory treatment insisted upon as essential to success in lacerations of the cervix uteri, according to the method recommended by Dr. Emmet, in a paper read by him before the N. Y. County Medical Society in 1876. This operation is still thought to be unnecessary by many able gynæcologists. In the interest of science and truth I must state that from what I have seen of the results of this simple operation it is a capital procedure if the laceration be excessive and cannot be cured by curetting the endometrium, by using Churchill's tincture of iodine to the endometrium and to the cervix after opening the enlarged Nabothian follicles, and by using a gallon of hot water twice daily in the vagina for some time, and by not operating until all sensitiveness in or about the uterus has been entirely relieved.

The paring of the cervix unloads many of the distended veins, and cures the ectropium if present, and also acts beneficially upon the endometritis and subinvolution usually present in these cases. If there is prolapse, of course a properly adjusted pessary will be necessary for the patient even after the operation. Smaller lacerations I have often cured by the use of iodoform and tannin applied twice a week, and tannin and glycerine tampons applied daily, one in front and one behind the cervix, and by using laxatives, tonics when required, and the hot douche. I have seen patients relieved permanently by the operation of trachelorrhaphy who had been treated unsuccessfully for many years.

I come now to the consideration of the value of the curette in the treatment of fungous, granular, and polypous endometritis, and I touch upon this curative agent for the reason that at the last meeting of the American

Medical Association, many gynæcologists denounced the instrument as barbarous, and as doing more harm than good. My colleague at the Mt. Sinai Hospital, Dr. Mundé, two years since, wrote an able paper on the silver wire curette, in which he reports twenty-five cases of metrorrhagia cured permanently by him by this curette, devised by Récamier in 1850, and recently modified by Dr. T. Gaillard Thomas. He justly condemns Sims's, Simon's, or Récamier's curette as dangerous when used against small polypi, fungosities, or granulations within the cervical or uterine cavity. I can corroborate, after two years' further large experience in my hands, the high value Dr. Mundé places upon Thomas's curette. In thirteen of his cases he removed remnants of placentæ or membranes; in ten there were fungous growths, the so-called endometritis chronica hyperplastica of Ohlshausen, who a few years ago gave an excellent description of this troublesome affection. The use of the curette or of Thomas's serrated scoop is the best means of checking uterine hemorrhage when there is anything abnormal within the uterine cavity, including removable foreign growths, that cause uterine hemorrhages. I use the curette almost daily in my office and in the dispensary, and I have never seen anything but good follow its use in my hands. I learned to use a similar instrument in 1873, while I was in Vienna, for the removal of adenoid growths from the posterior nares, and I mention it here incidentally as an evidence of its high value in any locality for the safe removal of unhealthy tissue. I also saw it used by Hebra in cases of epithelioma of the nose and of other parts of the body. Everywhere it was used to advantage, and especially as a ready means of arresting uterine hemorrhage, as detailed fully in Dr. Mundé's paper.

What is our experience with hot water injections as a uterine hæmostatic? In atony of the uterus, as recommended by Trousseau of Paris in 1853, I have used hot water injections, per vaginam, of a temperature of from 110° to 120° F., with the most remarkable results. This is a most efficient method of checking profuse uterine hemorrhages, even in ulcerations from carcinoma or rodent ulcer. I have used them with one or two teaspoonfuls of liquor ferri sesquichloridi to the quart of water with benefit. Although hot water injections had been recommended twenty-seven years ago for uterine bleedings, they were soon forgotten and not thought of until Dr. Emmet, a few years since, re-introduced their use, and secured for them a permanent place in our therapeutic resources in the treatment of uterine hemorrhages. It will, perhaps, be advantageous to compare the reports from practitioners abroad who have used it extensively for that purpose with our own in this country. I will briefly state I could not do without them, so efficient have they proved in my hands. How they act has been explained by Dr. William Schlesinger of Vienna, in the Vienna *Medizinische Blätter*, of which he is the editor.

"A few years ago, the first news of this procedure reached us from across the Atlantic. At that time it was hardly deemed worthy of notice. So greatly

was it mistrusted, that the proposition even to-day awaits a trial in many of our clinics. It was forgotten that no less an observer than Trousseau recommended this method over twenty years ago, *Gazette des Hôp.*, No. 33, March 19, 1853, pointing it out as the surest means of arresting hemorrhages, menorrhagia, and metrorrhagia. Trousseau even endeavoured to offer an explanation for its physiological effect by a simple experiment. If one hand is placed in water at 40° R., the other in water at the freezing point, the cooled hand feels warmer, the other cold. Trousseau's proposition came to us as something new a few years ago, as proposed by Emmet. This new method was given a fair trial by Windelband, *Deutsche Med. Wochenschrift*, 1876, who used hot water injections in all uterine hemorrhages, and highly recommends it—having found it efficient in metrorrhagia after abortion, after premature delivery, and after parturition at full term; in bleedings caused by distension of the uterus, or chronic inflammations, or in metrorrhagia from uterine fibroids; so, also, in metrorrhagia occasioned by carcinoma. Windelbaum begins with water of 38° R., and elevates its temperature gradually to 41° R., and he ascribes its effect to the direct influence of the heat upon the muscular fibres of the uterus. That the hot water causes coagulation of the blood and thrombi, he has not seen.

"Similar to these favourable results is the experience of Jakesch in Prague, *Prager Wochenschrift*, No. 41, 1876, and Landau, *Breslauer Klinik*. Jakesch reports twenty-two cases in which he applied hot water, only two cases failed. In the first the water used was too cool, only 38° R., and in the second there was a puerperal infection, in consequence of which the patient died. Hot water produces contractions of the uterus; this was proved by Schlesinger, who introduced his finger near the internal os, and directed the hot water towards the uterus, which he felt immediately contracting violently. Runge, *Berlin. Klinische Wochenschrift*, 1877, No. 13, has applied the method in twenty-two cases; ten were atonies of the uterus post-partum, seven bleedings after abortion with retention of portions of the placenta, five in metrorrhagiæ caused by neoplasms. He states if there are portions of placenta retained, or blood coagula, the application is useless; so, also, in cases of new formations the effect is only temporary, of course. In three cases of atony of the uterus he had no good results, in all the others he succeeded in checking the hemorrhage. The author lauds another good effect of hot water injections on the constitution of the patient, since the bloodless and cold-blooded patient becomes warm thereby. Peter and Guéneau de Mussy also speak in its favour, *Journal de Méd. et de Chirurg.*, vol. 48, March, p. 107, and *Gazette des Hôp.*, No. 136, 20 Nov. 1875. Rubber bags filled with hot water and applied to the loins and the spine, and hot baths of 2–3 minutes duration answer the same purpose.

"The latest report on this subject comes from the Charité in Berlin, from Dr. Fassbender (The Irrigation of the Uterine Cavity with Warm Water, 40° R., in Childbed Bleedings, by Carl Richter, *Zeitschrift f. Geb. und Gynæcologie*, 1878, vol. ii. p. 284, 2d part). Hot water injection of the uterine cavity is at present the only method applied in the Charité beside the administration of from 2–5 grms. of secale cornut. *pro die* in alarming uterine hemorrhages, and has never yet failed in a single instance, although in a few cases the bleeding returned again. Richter's observation extends over a period of ten months. The injections were applied in 112 different bleedings, 105 of the patients were puerperal cases; 2–3000 grms., 90 ounces, of water sufficed generally. The principal effect is produced not by the direct contact of the water with the cervix uteri only, but by its reaching also the bleeding intra-uterine cavity, which it washes out. He accounts in this way for the excellent results obtained in Berlin. The heat of the one per cent. solution of carbolic acid used is always measured by the thermometer.

"The water is poured into the irrigator at a temperature of 40.5° R., and reaches the uterus with one of 39.5° R. to 40°. This temperature is the limit at which it is possible to move a not unusually hardened hand for some time to and fro, without scalding—although the burning is well felt, a half degree more could hardly be tolerated. Below 38° R. the injections were useless. If they are kept within the limits of 38° to 40.5° R. the patients complain a little at first, but then they stand it well. Even in recent perineal ruptures we went on with

the injections. Under all circumstances ascertain first, that there are no coagula in the uterus or vagina, because under these the bleeding might continue in spite of the hot water injections. It is the author's view that these injections act not only by causing contraction of the uterus, but he thinks the contact of hot water with the partly denuded inner wall of the uterus causes a slight inflammatory irritation, an œdematous transudation, and a swelling of the tissues, principally the submucous inter-muscular and peri-vascular connective tissue, by which the blood-vessels become compressed, and their lumina are thereby occluded."

Dr. Schott says:—

"Excellent, and, according to my experience, innocuous in the treatment of menorrhagia and chronic hyperæmiæ of the body of the uterus are the results obtained by the use of hot water injections; they stop pain and check bleedings instantaneously if we use hot water injections of the proper temperature; they must be in most cases of 40 to 41 degrees Reaumur = 122 Fahrenheit. The injection is to be continued until the pain and the bleeding stop. If they return, renew the injection. But I deem it a good precaution to stop every fifteen or thirty seconds, and then inject again, in order to allow the circulation again to cool the heated parts. That we succeed, he says, we can convince ourselves by the thermometer immediately after such an injection, which will show an elevation of a few tenths of a degree only. If we inject uninterruptedly we not only run the risk of lessening the contrast between the hot water and the parts, upon which the whole irritation depends, but we are apt to produce thereby a relaxation and paralysis of the parts, as proved by Max Runge on the human female and upon rabbits. Heat and cold act here entirely alike upon the irritable substances. Contractions of the uterus and of its bloodvessels are its results. We are often enabled to perceive the narrowing of the vagina based upon this contraction, produced by the hot douche. It is our aim by these means not only to cause the bloodvessels to contract, but also the uterine muscles."

Besides the hot douche, I have seen excellent results follow the use of quinia and of salicylate of soda in my practice in chronic hyperæmic conditions of the pelvic organs, as suggested by Schott, who says:—

"The best results were obtained in cases of menorrhagia and congestions of the pelvic organs by salicylate of soda. It acts as an antipyretic and antihemorrhagic remedy. It is highly beneficial, especially where there is congestion, swelling, pain, and slight elevation of temperature. Where it causes slight nausea, it can be given per rectum, by means of a long rectal tube. An elastic catheter (male) and a glass syringe are sufficient for the purpose, and the patients can use it themselves. From 15 to 30 grains of the remedy are administered for this purpose every hour, until the bleeding stops; if it returns, renew the dose. In obstinate cases large doses ought to be used. It causes ringing in the ears and temporary deafness. Only in affections of the heart is its use contraindicated. By this treatment menstruations that lasted 12 to 13 days, with great pain, ceased on the second day. My experience with this remedy extends over a period of several years."

The effect of salicylate of soda is shown by Moeli and Riegel to be the production of greater tension in the arteries of the surface, as proved by the sphygmograph in cases of fever. Bush and Strassburger have shown that during the use of quinia the radiation of heat of fever patients becomes increased, while the heat of internal organs is thereby lessened. The pale and cold skin becomes warmer, and consequently reddened, and also a greater secretion of the sweat-glands takes place. In short, these remedies act as narrowers of the bloodvessels. The antiphlogistic action of quinia and of salicylate of soda is proved as well as their antipyretic

effect clinically, as has been shown experimentally regarding quinia by Scharren, Croich, Martin, Zahn, and Appert; also that they check the emigration of colourless blood corpuscles. Their therapeutical value has also been shown to be, besides their antiphlogistic and antipyretic effect, that of checking secretions in catarrhal inflammations. Inflammatory and catarrhal secretions are processes that are very similar to the anomalies of menstruation, especially menorrhagia. When the uterus was largely swollen, I have seen it diminish in size under the use of salicylate of soda in large doses, so that if persisted in too long an atrophy and anæmia of the uterus might be feared; even in lying-in women not only the body of the uterus but the greatly swollen lips of the cervix become better by the swelling being greatly reduced in a few hours by the use of the salicylate of soda. This effect can be favourably compared to that of quinia in reducing the size of a swollen spleen. The salicylate of soda is to be used during the bleeding or the excessive menstruation.

What shall be done between the bleedings? Here we must seek the cause and study the external influences that cause or aggravate the flow. We must try to remove all causes which produce uterine or pelvic congestion, or which increase the general blood pressure. After each obstinate menstruation the patient ought to remain in bed two to three days in a horizontal posture, the same as after childbirth; the regeneration of the uterine mucosa ought to take place under the least possible blood pressure. Patients suffering from active or passive hemorrhages, accompanied by pain and some fever, indicating chronic metritis, should avoid exercise of any kind. Where there is a weakness in the uterine bloodvessels, even a long walk may be followed by serious consequences; but when the bleedings have been controlled for one or two weeks, walking seems to act as an excellent tonic, as shown by Nawrocky and Kochalewsky, who have demonstrated that muscular movements act as a tonic upon the whole circulatory system. But if by walking or other damaging influences the flow of blood and pain are increased, showing pelvic congestion, rest ought to be again enjoined, especially by elevating the pelvis, even the knee-elbow position may be useful in such cases. In this way we make an abstraction of blood without its evil consequences. In the same manner that ulcers of the leg heal by elevating the limb, so also chronic congestion of the uterus, by giving time to the newly formed small bloodvessels to attain strength in their walls to render them more fit to resist any pressure acting upon them. The patient should always, while walking about, wear a good bandage. A single piece of stiff cloth, fitting around the navel, tucked in at the hips, with eyes and hooks, or bands that can be snugly tied together, cut out at the ilium, with the insertion of a piece of elastic behind, furnishes the best and the cheapest abdominal bandage. If the uterus and pelvic organs are thus bandaged they are protected from jars and jerks and sudden movements, which, according to Golz, fill the uterus with

blood. This rule refers especially to horseback riding. All sexual excesses ought to be avoided. Coition should be interdicted; the following pain and congestion will probably aid in enforcing this prohibition. Many patients complain of cold feet and a cold sensation in the pelvic region towards evening. If this is permitted to continue, pelvic congestion follows, and causes a larger flow at the next period. To prevent this, warm clothing and early going to bed and good nourishing food and a general tonic, invigorating treatment are necessary. If the rectum is filled with feces or the bladder with urine, an impediment to the pelvic circulation is the consequence, and should be avoided. Rest, elevation of pelvis, poultices, hot injections, cold friction baths, with a coarse, so-called Turkish, towel, on going to bed. Ergotine, quinia, salicylic acid, either singly or in combination, are to be prescribed.

In obstinate cases the remedies and injections are to be used during the whole time intervening between the periods, even if given in small doses, and to be increased *during the period*, in very obstinate cases *several days before*, *during*, and *after menstruation*, with confinement to bed. We can thereby arrest even the growth of myomata, if we can prevent the greater afflux of blood to the pelvis, and the catamenial hyperæmia of the tumours, and thus deprive them of their nourishment. With ergotine, quinia, and salicylate of soda we accomplish this result against menstrual hyperæmiæ and metrorrhagiæ, with dietetic and hygienic measures, and the use of astringents during the period, partly intra-uterine (these, of course, in exceptionally desperate cases only) and partly intra-vaginal. These should also be continued between the periods. Cocoa-butter balls, with alum and tincture of iron, with glycerin tampons applied as high as possible should be used between the periods. After their application the vaginal mucosa comes away in larger or smaller shreds, after which we cease treatment for several days. Slight flexions that have existed for a long time become straightened by their use, simply by their tonic effect and that of reducing the swelling of the mucosa. When we want an absorbent action, in otherwise vigorous persons, we use balls of iodine or bromide of potash; these also cause a peeling off of the vaginal mucosa, and their effect is similar to that of alum.

Pencilling with iodine in the fornix, or externally over the epigastrium, acts like a blister of cantharides, and has a reflex irritative effect upon the bloodvessels. I employ this measure only if the patient be in a fair condition, but never when broken down. In the latter an invigorating, tonic treatment is of paramount importance. Mild abstraction of blood locally also acts well in some cases. Loss of elasticity in the capillaries, according to Ludwig, is a promoter of hyperæmia and inflammation; by emptying them temporarily of their contents they regain their normal elasticity, and by scarifying and drawing a small quantity of blood we prevent a metrorrhagia. Schrœder prefers scarifying to leeches; punc-

turing the cervix, according to Spiegelberg, proves beneficial. Scarifications of the uterine mucosa, in the cavity of the body, are highly efficient, with a narrow, probe-pointed bistoury, making eight to ten superficial incisions, lengthwise, anteriorly, and posteriorly. The pain is scarcely felt after the knife is withdrawn.

Uterine colic, caused by retention of blood in the cavity, can be relieved by holding the os open a little while with Ellinger's or Palmer's dilator or with a polypus forceps. Congestive pains are thereby often immediately relieved. The cutting through of the dilated capillaries in the cavity of the uterus acts like the same procedure in the telangiectatic marks of the face; the cut vessels become obliterated and may be partly reproduced with a narrow lumen by restoration of their somewhat paralyzed walls. Baker Brown's recommendation to cut the capsule of intra-uterine myomata finds its scientific explanation, as to its antimenorrhagic effect, through the division of its dilated bloodvessels.

The scarifications, intra-uterine and of the cervix, when this latter swells through hyperæmia, explain the beneficial effect of many operations practised upon the neck of the womb and in cases of chronic inflammation. Where more is needed, we use intra-uterine escharotic cauterizations: these are very rational where there is also a catarrhal affection with hypersecretion. But we must bear in mind never to use intra-uterine caustic applications unless the internal os be easily permeable to the sound, and not to make too deep cauterizations for fear of producing perimetritis or parametritis.

Résumé.—In the treatment of menorrhagia, metrorrhagia, or chronic pelvic congestions and hyperæmic conditions, *rest*, with pelvis elevated, is of the highest importance. Hot water injections and scarifications of the cervix and endometrium I have found beneficial. Salicylate of soda, quinia, digitalis in large doses, and opium—for the relief of pain and where a nerve sedative is indicated—are invaluable means of arresting uterine hemorrhages. Ergotin in large doses, given before, during, and after menstruation, every hour until the hemorrhage, if profuse, ceases, is one of our most valuable aids in arresting it. The use of intra-vaginal balls of the astringents, alum, tannin, and tincture of iron, preferably four grains of alum with a few drops of iron and glycerin, introduced every hour if the hemorrhage is alarming, or, still better, the careful intra-uterine application down to the fundus of tannin and glycerin upon a probe, or of Monsell's solution of the subsulphate of iron, half diluted with water, have in my hands checked uterine hemorrhages that have resisted treatment for months. I have never seen any ill-effects follow the intra-uterine application of iron in a large number of obstinate metrorrhagias in my own practice. Cauterizations in catarrhal endometritis, five or six days after the menstruation has ceased, repeated once a week, effected in my hands

the contraction of the enlarged womb and its bloodvessels, and cured the catarrh.

I repeat, that intra-uterine applications should never be used where there is an obstruction or a contraction at the internal os or any part of the cervical or uterine canal and cavity, and that flexions have to be straightened by the careful use of the sound, by the use of Thomas's anteflexion, or Graily Hewitt's cradle, or Gehrung's or Bozeman's new pessary, and, if adhesions be present, by Bozeman's method of tamponing the vagina, described by me for uterine displacements with adhesions and prolapsed ovary, in the *New York Hospital Gazette*, April 5, 1879. These tampons act by supporting the parts upon a gentle cushion of cotton, relieving thereby part of the hyperæmia of the uterine and ovarian bloodvessels.

In submucous and intermural fibroids, Hildebrandt's method of hypodermically injecting ergotine daily, often for months, has frequently checked long-continued metrorrhagia. In cases of carcinoma or rodent ulcer, fungosities, polypi, granulations, the curette and the application of Monsell's solution of iron have arrested uterine hemorrhages. Often I apply the pure powder of the subsulphate of iron to the cervix, or a concentrated solution of alum, if the bleeding take place from an eroded cervix. I also occasionally apply to the endometrium fuming nitric acid or the hot iron, a few days after menstruation, without producing other than good results, but only in exceptionally rare and obstinate cases.

Compressing the abdominal aorta, for the purpose of checking excessive uterine hemorrhage, has also proved in my hands a valuable method in three instances where all other means had failed, and the patients were almost moribund when I first saw them.

ARTICLE VI.

ON THE ACTION OF CARBOLIC ACID UPON CILIATED CELLS AND WHITE BLOOD CELLS.

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RICH as is the literature of the last two decades in records of investigations on the local and general action of carbolic acid upon the living organism, the minute changes which it produces in the cells themselves, seems to have attracted but little attention. To those who have adopted the postulate upon which the Listerian treatment of wounds is based, the study of the action of the antiseptic upon bacteria and allied organisms has seemed very naturally of paramount importance; while those, on the other hand, who denying, or at least not accepting, as yet proven, the the-